REMARKS

Claims 1-13 are now pending in the application. Claims 11-13 are new additions presented in this amendment. The amendments to the claims contained herein are of equivalent scope as originally filed} and, thus, are not a narrowing amendment. The Examiner is respectfully requested to reconsider and withdraw the rejection(s) in view of the amendments and remarks contained herein.

REJECTION UNDER 35 U.S.C. § 103

Claims 1, 2, 3 and 7-10 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Suzuki et al. (U.S. Pat. No. 5,058,480) in view of Mohrbacher (U.S. Pat. No. 5,602,356). This rejection is respectfully traversed.

Applicants' amended claims 1 to 3 and 7 to 10 set forth that peak information indicative of magnitude of the motion in a predetermined direction of the operator is detected, so as to distinguish the present invention from the cited references, Suzuki et al. and Mohrbacher. These amendments are supported at page 18, line 8 through page 21, line 10 of the present specification.

Specifically, the above part of the present specification describes as follows:

An acceleration value α indicative of the magnitude of an acceleration vector as the sum of respective vectors of accelerations of the operating terminal unit OU in the x-axis direction and the y-axis direction is obtained, assuming that values of acceleration in the moving direction of the operating terminal OU are positive, only when the acceleration value α is positive, a local peak and a dynamics value are detected.

Cited References

Suzuki et al. (USP No. 5,058,480) relates to a musical-tone-control apparatus that can control musical tones according to a performer's swing of a baton (col. 1, lines 7 to 9).

A performer holds baton 1 and swings baton 1. The acceleration of the swinging motion is detected by acceleration sensor 2, and output signal Sg. When the amplitude of output signal Sg exceeds threshold Vth, comparator circuit 11 produces a "High" level signal and applies it to delay circuit 13. Delay circuit 13 delays the signal by a constant interval, and produces key-on signal KON, which is supplied to hold circuit 12 and register 14. Hold circuit 12 holds output signal Sg of value Vs from acceleration sensor 2 by using key-on signal KON, and applies the signal of Vs to A/D converter 15 as level signal LVL that corresponds to the intensity of the swing. Level signal LVL is converted to digital signals and applied to resister 16. Tone generator 20 generates a musical-tone signal of a pitch corresponding to level signal LVL of value Vs that is specified at point C when key-on signal KON is produced. (col. 3, lines 24 to 43).

In FIG. 7, comparator circuit 111 compares output signal Sg from acceleration sensor 2 with positive threshold Vth, and provides a "High" level signal when Sg>Vth. Similarly, comparator circuit 11b compares output signal Sg with negative threshold –Vth, and produces a "High" level signal when Sg<Vth. The output signal of comparator circuit 11a is applied to one input of OR gate 22, and the output signal of comparator circuit 11B is applied to the other input of OR gate 22, by way of AND gate 24 that switches the signal according to the operation of mode-transfer switch 23. The output of OR gate 22 is applied to monostable multivibrator 26 that produces a constant width

pulse signal. The pulse signal is delayed a predetermined interval .DELTA.t by delay circuit 13, and produced as key-on signal KON. (col. 4, lines 3 to 20).

Mohrbacher (USP No. 5,602,356) relates to techniques for producing music (Col. 1, line 8).

Sweet spot 149 in the center section of keycap 148 is designated as a "sweet spot" in which the note produced is exactly the note selected by the musical note assist data without regard to the level of force applied to keycap 148. Outboard of sweet spot 149, however, the force applied to keycap 148 may be used to modify the note produced. When a force below FT1 is applied to outboard areas 145 or 147, the note produced is the same as the note that would be produced if sweet spot 149 were activated. Similarly, if a force above second force threshold level FT2 is applied to one of the outboard areas, the note produced is the same as the note that would be produced if sweet spot 149 were activated. If force is applied to outboard areas 145 or 147 at a level between first and second force threshold levels FT1 and FT1, the tone of note produced will be changed or bent (Col. 19, lines 13 to 37).

Itoh et al. (UPS No. 5,890,116) relates to a conduct-along system for adding expressions to sounds and/or images (Col. 1, lines to 5 to 6). Itoh et al. discloses a technique according to a conduct-along system which detects movement of an input device, and controls parameters of music reproduction.

Ishida (USP No. 4,341,140) relates to an automatic performing apparatus for reading out tone data preset in a memory in accordance with a motion of a baton and applies the tone data to a tone generating section (Col. 1, lines 6 to 9). Ishida discloses

an automatic performing apparatus for controlling a performance tempo of music and volume according to motion of a baton.

Usa (USP No. 5,808,219) relates to motion discrimination methods and devices which discriminate kinds of motions made by a human operator, such as conducting operations which are made to conduct the music using an electronic musical apparatus (Col. 1, lines 7 to 12). Usa discloses a motion discrimination method of discriminating beats using Hidden Markov Models.

Moore (USP No. 5,920,024) relates to a method and device which couples the production of sound with motion. In particular, it relates to a method and device for producing sound responsive to x-y-z coordinate movement (Col. 1, lines 7 to 10). Moore discloses a motion-to-sound apparatus which detects movements in three-dimensional space, and produces sounds oriented such as to be intuitively familiar.

Difference Between Cited References and Present Invention

According to the present invention as set forth in amended claims 1 to 3 and 7 to 10, when an operator carries out a certain operation (motion in a predetermined direction), the magnitude of the operation (motion) is compared with two threshold values (t1 and t2), and then, different kinds of control are executed on musical tones to be output (music reproduction control or acoustic effect control) according to the results of the comparisons.

Suzuki et al. discloses a technique in which, when the baton 1 which is provided with the acceleration sensor 2 is swung and an output from the acceleration sensor 2 exceeds the predetermined threshold value, the output is held, after a constant time interval has elapsed from the time point the output from the acceleration sensor 2 had

exceeded the predetermined threshold value, the held output of the acceleration sensor 2 is input, and then, tone-generation timing and tone elements such as tone pitches, tone volumes, or tone colors are controlled based on the output from the acceleration sensor 2. Suzuki et al. discloses detecting swing motions in both directions (upward and downward), comparing sensor outputs corresponding to the swing motions with two threshold values, positive and negative threshold values, generating a constant width pulse signal when both of the sensor outputs exceed the respective positive and negative threshold values (col. 4, lines 3 to 20).

Suzuki et al. certainly discloses two threshold values Vth and –Vth. However, the two threshold values are merely different from each other in sign and are the same value so as to make the threshold values corresponding to the respective swing motion directions. A sensor output indicative of a motion in the upward direction is compared with the positive threshold value Vth alone, and a sensor output indicative of a motion in the downward direction is compared with the negative threshold value –Vth alone. That is, each sensor output is not compared with both of the two threshold values. Thus, in Suzuki et al., it can be regarded that the sensor output is substantially compared with a single threshold value insofar as a swing motion in one direction is concerned.

In contrast, according to the present invention, the magnitude of a motion in a predetermined direction of the operator is detected and compared with the two threshold values, and then different kinds of control are executed on musical tones to be generated according to the results of the comparisons. That is, if the detected magnitude of the motion in the predetermined direction lies within a range (between the first and second threshold values), at least one acoustic effect to be applied to the piece

of music is controlled, and if the detected magnitude of the motion in the predetermined direction exceeds the first and second threshold values, music reproduction of the piece of music are controlled.

Mohrbacher discloses that one key (the keycap 148), which is one of input elements which construct the musical instrument, has a function in which regular musical tones are produced as well as a function in which, when the key is activated in a predetermined area thereof at a force level between two threshold values, the scale of the musical tone is changed.

In Mohrbacher, a different effect is achieved when the key is activated in the outboard areas (areas 145 and 147); the predetermined area) at a force level between the first force threshold level and the second force threshold level, in comparison with an effect achieved when the key is activated in the center section (sweet spot 149) thereof at any force levels. That is, Mohrbacher performs different types of control between when the key is activated in the center section and when the key is activated in the outboard areas other than the center section. That is, even if the key is pushed at the same force level between the first force threshold level and the second force threshold level, pushing the key in the center section and pushing the key in the outboard areas cause different kids of control from each other. To detect the key pushing areas and carry out such different kinds of control, Mohrbacher requires additional information indicative of a part of the key that is activated, in addition to the motion information (force level).

However, Mohrbacher merely detects which area the key is activated, detects the force level of pushing of the key when the key is activated in the outboard areas, and

compares the force level with the two threshold values to determine whether the force level lies within the range between them. Thus, Mohrbacher does not detect the direction of pushing of the key (the key is necessarily pushed in a single direction as is distinct from an operating terminal unit as used in the present invention).

In contrast, according to the present invention, the magnitude of the motion in a predetermined direction, of the operator is detected and compared with the two threshold values, and then different kinds of control are executed on musical tones to be generated according to the results of the comparisons. That is, if the detected magnitude of the motion in the predetermined direction lies within a range (between the first and second threshold values), at least one acoustic effect to be applied to the piece of music is controlled, and if the detected magnitude of the motion in the predetermined direction exceeds the first and second threshold values, music reproduction of the piece of music are controlled.

Neither Suzuki et al. nor Mohrbacher disclose this arrangement of the present invention. Therefore, the present invention can provide the effect that music editing and acoustic effect can be applied by simple operations, for realization of a desired musical concept in his/her mind, which cannot be provided by Suzuki et al. and Mohrbacher.

Further, while it is generally employed to control a predetermined parameter such as volume and/or apply an acoustic effect according to the magnitude of an operation (motion). However, we believe that it is not known and would not be rendered obvious over the prior art including the cited references to carry out different kinds of control depending upon whether the motion is applied in a predetermined direction and whether the detected magnitude of the motion lies within a range between the first and second

predetermined threshold values as in the present invention; for example, carry out control such as detection of performance tempo if the detected magnitude of the motion in the predetermined direction exceeds both the first and second predetermined values.

In view of the above differences, we believe that our proposed amended claims 1 to 3, and 7 to 10 are patentable over Suzuki et al. and Mohrbacher, singly or in any combination. We believe that claims 4 to 6, which depends from our proposed amended claim 3, are also patentable over Suzuki et al. and Mohrbacher, singly or in any combination.

ALLOWABLE SUBJECT MATTER

The Examiner states that claims 4-6 would be allowable if rewritten in independent form. Accordingly, Applicants have amended claims 4-6 to include the limitations of the base claim and any intervening claims. Therefore, claims 4-6 should now be in condition for allowance.

CONCLUSION

It is believed that all of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicant therefore respectfully requests that the Examiner reconsider and withdraw all presently outstanding rejections. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance. Thus, prompt and favorable consideration of this amendment is respectfully requested. If the Examiner believes that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (248) 641-1600.

Respectfully submitted,

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